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partly in study at the Marine Laboratory at Cold Spring Harbor and in part at the World's Fair, Chicago, as assistant chemist to Professor Atwater in food analyses. The following year he was assistant in biology in the laboratory of Professor Conn at Wesleyan. He then entered the Medical Department of Yale University, graduating in '97 *cum laude*, also receiving the Keese prize for the best thesis. The following year was spent as junior assistant at the Worcester Lunatic Asylum and at the time of his death, April 7, 1899, he was serving in the same capacity at the McLean Hospital, Waverly, Mass.

Dr. Loveland was held in high esteem by those who knew him, both as a man and professionally. I quote from the last report of the Superintendent of McLean Hospital: "He gave unusual promise of success in the work which he had chosen for his professional career, for which he possessed admirable qualifications."

In 1897 Wesleyan conferred upon him the degree of M. A. for work done in comparative anatomy.

His more important papers were "On the Anatomy of *Taenia crassicolle* Rud." and "A Study of the Organs of Taste."

H. B. FERRIS.

HERBERT R. SPENCER,

OF BUFFALO, N. Y.

In the death of Herbert R. Spencer, which occurred at Buffalo, N. Y., February 7th, 1900, American Microscopy has lost the last of its three famous workers to whose successful efforts in the development of microscope and telescope objectives the scientific world has acknowledged its indebtedness. His father, Charles A. Spencer, working under the greatest disadvantages, beginning to make lenses when he was a lad of but twelve years, seeking by laborious and painstaking efforts in the little country village where he lived, to make his own optical glass for his experiments, but fired with the spark of genius which

triumphed over every obstacle, succeeded by 1847 in making microscope objectives which accomplished results in definition that astonished the world and transcended the efforts of the most famous European opticians. He boldly grappled with the assertion of these savants that they had obtained "the largest angular pencil of light that can be passed through a microscope object glass" and demonstrated by actual construction that the angle of aperture in these higher power objectives could be greatly increased and with it their defining and resolving powers. His was the pioneer work that for the world developed the possibility of lens-making as applied to the microscope and led the way in the wonderful progress of that art which has marked the last half of the nineteenth century. His two pupils were Robert B. Tolles and Herbert R. Spencer, his son. The former died in 1898 and now the latter has ended his days in the prime of manhood and in the midst of an active and successful career in the field of labor that he loved and honored.

Herbert R. Spencer was born at Canastota, N. Y., November 1, 1849, and was one of six children. Two sisters and a brother survive him and his aged mother still lives. His education was that of the common schools, but his active mind was not content with what they had taught him and throughout his life he was an indefatigable reader and student. In boyhood he was fond of scientific study and work. He loved too the outdoor life of the woods and fields, and his fondness for hunting gave him that perceiving eye which sees so much that with less favored mortals escapes their sight. He was quite young when he began his pupilage in his father's shop at Canastota, but from the beginning he loved his work and was ambitious to excel in it. This made him an apt pupil and to a great degree he inherited his father's genius. They worked together in constant effort to improve what had already been accomplished and to develop new work of still greater perfection. After the partnership between Charles A. Spencer and A. K. Eaton which had been formed in 1854 was dissolved, Herbert Spencer became his father's partner in the optical business which was

carried on by them at Canastota until the autumn of 1873, when their shop was destroyed in a disastrous fire. Their tools and machinery which they had accumulated by many years of toil and saving were lost, as was all their finished work and much that was in process of making with their valuable records and drawings. It was a crippling blow but father and son plucked up their courage and taking a little barn for their workshop struggled along as best they could until 1875, when they left Canastota and connected themselves with the Geneva Optical Works at Geneva, N. Y. In 1877 they formed the partnership known as Charles A. Spencer & Sons which continued for three years. In these last three years of his life the father's health was failing and with waning vigor his own productiveness ceased, while that of his son Herbert increased with his increasing responsibilities and the new objectives of those years were the product of his own genius and skill. Several of these came into the hands of President Barnard of Columbia College, New York, who was one of the United States Commissioners to the Paris Exposition of 1878, and they were exhibited by him there with the happy result that the highest award of the Exposition—its large gold medal—was awarded to Charles A. Spencer & Sons for their superior excellence.

Charles A. Spencer died in 1881 and from 1880 until 1889 Herbert R. Spencer carried on the business of making microscopes, telescopes and their objectives under his own name at Geneva, N. Y., removing in the latter year to Cleveland, Ohio, where he established the H. R. Spencer Optical Company. In 1891 the Spencer & Smith Optical Company of Buffalo, N. Y., was incorporated and Buffalo became his home for the remaining years of his life. In 1895 the Spencer Lens Company was organized and bought out the Spencer & Smith Company. Herbert R. Spencer became the superintendent of its shops and found in its systemized business a larger and better field for his efforts than he had before known. He became warmly interested in developing and perfecting the several types of their well known Spencer microscopes and in largely increasing the line of their Spencer objectives and microscope accessories.

He was greatly interested in the wonderful developments of later years in optical science; the great variety in optical glass as produced at Jena gave him a broad field for his selection, of which he was quick to take advantage. He placed all his formulas in the hands of the Spencer Lens Company and taught skillful assistants to do the various processes of construction and correction which he himself had so laboriously learned, so that when he felt the approach of sickness in the autumn of 1899 he expressed his keen satisfaction that his work, so well begun, could be continued without difficulty in his absence. He had assumed a trust and was faithful to it to the end. He died at Buffalo, February 7, 1900.

At fifty years of age he was seemingly in the prime of a useful life too soon ended, and yet in his comparatively short career he had done much for science. By his genius, his tireless efforts and painstaking researches he accomplished results in applied optics which gave him rank with the foremost of the world's workers in that field, with Leuwenhoek, Amici, Hartnack, Zeiss and Abbé in Europe, with the elder Spencer and Tolles in America; accomplishments which have made possible the modern discoveries in medical science and hygiene with their beneficent life-saving results. Like his father he was ambitious in his work and critical of it; there was always in his own vision a better that mocked his best, and he was never satisfied until that better was secured and a better still beckoned him forward. He was most skillful in his manipulation as in formulating and the objectives made under his instructions at each step in his progress kept rank even-paced with the best of similar grades made elsewhere at the time. He was of a generous temperament towards others and never spoke unkindly of their work. To his friends whom he knew well there was a genial side to his personality which was very attractive. Towards others he manifested a quiet reserve but in all his relations of life he was modest and unassuming. His early death is a loss not only to his many friends but to the scientific world.

HENRY R. HOWLAND.
